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A NEW COMPOSITE LEADING INDICATOR OF THE CANADIAN ECONOMY

by

Robert Lamy

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Economic Analysis and Forecasting Division
Fiscal Policy and Economic Analysis Branch
Department of Finance, Canada

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Abstract

Leading indicators are a forecasting tool used to identify cyclical changes in the economy prior to their occurrence. They were first developed in the 1930s by A.F. Burns and W.C. Mitchell. These first indicators were based on movements in a given economic variable that tended to precede movements in overall economic activity. In more recent research a variety of leading indicators have been combined into a composite indicator. This has reduced the number of false signals of economic downturns and has provided more accurate indications of the cyclical fluctuations than possible from any single component. The lack of success of Canadian economic indicators to give advance warning of the last downturn in economic activity has led us to develop a new leading indicator for Canada.

The new composite leading indicator provides a reliable advance signal of recessions and recoveries. A simplified version of the new composite leading indicator, representing 76 per cent of the total indicator, also gives an advance warning of a cyclical turning points about one month earlier than the complete version. The key characteristics of the performance of the new composite leading indicator of the Canadian economy are: the new composite leading indicator would have given only one false signal of a turning point over the past 30 years; since 1961, it would have given advance warning of all recessions and all but one recovery; and the average forecasting lead at business cycle peaks and troughs are 7.0 and 2.6 months, respectively.

Résumé

Les indicateurs avancés sont des outils de prévision servant à identifier à l'avance les changements cycliques de l'économie. Ils ont été introduit pour la première fois durant les années 1930 par A.F. Burns and W.C. Mitchell. Les premiers indicateurs étaient fondés sur les mouvements d'une série économique ayant tendance à précéder l'évolution de l'ensemble de l'activité économique. Les recherches plus récentes combinaient plusieurs indicateurs économiques en un indicateur composite. Ceci permettait de réduire les faux signaux d'une récession et d'obtenir une indication plus juste des fluctuations cycliques. Le succès mitigé des indicateurs économiques canadiens à signaler à l'avance le repli le plus récent de l'activité économique nous a incité à développer un nouvel indicateur composite avancé de l'économie canadienne.

Le nouvel indicateur composite avancé s'est avéré un indicateur précurseur fiable des récessions et des reprises. Une version simplifiée du nouvel indicateur composite avancé, représentant 76 pour cent de l'ensemble de l'indicateur, permet aussi de signaler à l'avance les points de retournement cyclique un mois plus tôt que la version complète. Les principales caractéristiques de la performance du nouvel indicateur composite avancé de l'économie canadienne sont: le nouvel indicateur composite avancé aurait donné seulement un faux signal d'un point de retournement au cours des trente dernières années; depuis 1961, l'indicateur aurait signalé à l'avance toutes les récessions et toutes les reprises, à l'exception de la reprise en 1975; et l'avance moyenne au sommet et au creux du cycle d'affaire est respectivement de 7 et 2.6 mois.

INTRODUCTION

Leading indicators are a forecasting tool used to identify cyclical changes in the economy prior to their occurrence. They were first developed in the 1930s by A.F. Burns and W.C. Mitchell. These first indicators were based on movements in a given economic variable that tended to precede movements in overall economic activity. In more recent research a variety of leading indicators have been combined into a composite indicator. This has reduced the number of false signals of economic downturns and has provided more accurate indications of the cyclical fluctuations than possible from any single component.

The lack of success of canadian economic indicators to give advance warning of the last downturn in economic activity has led us to develop a new leading indicator for Canada. This report presents a new composite leading indicator of the Canadian economy. Section 1 illustrates the leading relationship between each component of the composite indicator and cyclical turning points of the economy. The construction of the composite index from its components is discussed in section 2. The final section analyses the usefulness of the new composite leading indicator as a predictor of cyclical turning points in economic activity.

I COMPONENTS OF THE NEW COMPOSITE LEADING INDICATOR

The components of the new composite leading indicator were chosen after an evaluation of a large number of leading series in terms of coverage of various economic activities, timing at turning points and the availability of data. The new composite leading indicator of the Canadian economy consists of seven leading indicators[1] representing the various sectors of the economy. These sectors are: consumption, investment in residential and non-residential construction, inventories, exports, and money and labour markets, as indicated in Table 1.1. The leading indicators of the first five sectors cover approximately 75 per cent of total domestic and foreign demand.

Table 1.1

Components of the New Composite Leading Indicator and Sector Represented

Components	Sector Represented
Indicator of consumer confidence: - Unit sales of passenger cars - Unit sales of existing houses	Consumer Spending
Real residential building permits	Residential Investment
Real non-residential building permits	Non-Residential Construction
Ratio of inventories to shipments in the manufacturing sector	Inventory Investment
U.S composite leading indicator	Exports
Yield curve	Monetary Conditions
Help Wanted Index	Labour Market Activity

1. All components are monthly data and start in January 1960.

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1 COMPONENTS OF THE NEW COMPOSITE LEADING INDICATOR

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Why do movements in these indicators lead overall economic activity?

Indicator of Consumer Confidence

Consumer spending is the largest component of total economic activity in Canada, representing nearly 60 per cent of the real GDP and therefore is one of the key determinants of cyclical fluctuations. Before making major purchases, consumers generally consider current buying conditions, personal financial positions, and the employment outlook. Thus, a variation in consumer attitudes, caused for example by a change in interest rates, will lead to changes in consumer spending and, consequently, economic activity in general.

The only data on consumer confidence -- the Conference Board of Canada's Index of Consumer Attitudes -- is available quarterly, while most other leading indicators are available on a more frequent monthly basis. In order to make the new composite leading indicator as current as possible, we have constructed a monthly proxy for consumer confidence. Sales of homes and passenger cars are very sensitive to changes in the economic and financial situation of consumers because these purchases commit them to large payments for extended periods of time. As a result, an index of the sum of monthly data on the sales of passenger cars and existing homes[2] serves as a useful proxy for monthly movements in consumer confidence and is a leading indicator of total consumer spending.

Real Residential Building Permits

Real investment spending on residential construction comprises three components: new house construction, renovations and improvements, and real estate commissions. The first is the largest component, accounting for 50 per cent of the total in 1990. Investment spending on new housing involves a construction process extending over several months. The first stage of this process is securing the building permit. Hence, the real value of residential building permits lead investment spending in new housing[3] [4].

Real Non-Residential Building Permits

Investment in non-residential construction is also spread over a period of time, but the time required to complete the project is greater. As with the residential construction process, the first commitment to economic activity is the decision to obtain a building permit. Consequently, the value of non-residential building permits in real terms constitutes a leading indicator of investment in this sector[3].

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[2] Data for sales of existing houses are from the Canadian Real Estate Association. We would like to thank Linda Thénault of the association for providing us with the data from 1960 to 1979.

[3] A study by J.F. Carbonneau (1984) showed that filtering the data makes it possible to obtain a more transparent leading relationship between the building permits in real terms and the cyclical turning points in investment spending. In our case, however, filtered monthly figures did not improve the performance of the new composite leading indicator. Unfiltered data were therefore used.

[4] Housing starts are often used as a leading indicator instead of building permits. We found that the composite index lost on average 1.8 months in lead time in signalling downturns when housing starts were used instead of building permits. As with housing starts, building permits data are revised each month. An analyst with the Investment and Capital Stock Division at Statistics Canada has indicated to us that revisions are not substantial and seldom change the sign of the month-to-month change.

Ratio of Inventories to Shipments in the Manufacturing Sector

The ratio of inventories to shipments is often used by analysts to predict future changes in production. When manufacturers have excess inventories, as indicated by a high ratio of inventory to shipments, inventory demand, and hence production, typically weakens to bring the ratio to a more normal level. This economic series, therefore, tends to be a leading indicator of changes in manufacturing production.

U.S. Composite Leading Indicator

In 1990, Canada exported over a quarter of its total production of goods and services, about 75 per cent of which was purchased by the United States. The U.S composite leading indicator, developed by the U.S Department of Commerce, has registered cyclical turning points before those in the aggregate U.S. economy since the early 1950s[5]. On average, this indicator has led recessions by about nine months and upturns by three months. As the U.S. demand for imported goods and services is closely related to the cyclical level of activity in the U.S., this indicator is also a good leading indicator of Canadian exports.

Yield Curve[6]

A recent study by Keen (1989) reported that there was a significant leading relationship between changes in the yield curve and the business cycle.[7] This occurs because tightening (loosening) monetary conditions are reflected in rising (falling) short-term interest rates. Long-term interest rates, on the other hand, are typically not affected to a large degree by movements in short-term interest rates. Rather, long-term rates are influenced predominantly by expectations of future inflation. Consequently, during periods of tight monetary conditions short-term rates tend to exceed long-term rates -- there is an inversion of the yield curve. Since monetary conditions affect real activity with a lag, changes in the yield curve tend to give advance signals of changes in economic activity.

Help Wanted Index

The Help Wanted Index measures the number of help wanted advertisements in the classified section of major newspapers across the country. When the economy begins slowing down, employers reduce the number of new hires, which is usually preceded by a decline in the number of vacancies being advertised in daily newspapers.

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[5] For further details on the U.S Department of Commerce composite leading indicator, see Hertzberg and Beckman (1989). Based on a rule that three consecutive months of decline signal a recession, this leading indicator has given four false signals since 1948, in 1950-51, 1966, 1984 and 1987.

[6] The yield curve is equal to the interest rates on five-to-ten-year federal government bonds minus the 90-day commercial paper rate. The series is smoothed by taking the percent deviation of a four month moving average of the yield curve from its standard deviation. This eliminates inversions of the yield curve which are either too short or not large enough to signal a significant tightening of monetary conditions.

[7] We also tried the real stock of money (M1) as a leading indicator for monetary conditions. However, the composite index was significantly less reliable in forecasting cyclical turning points (see Table 1.5). We found that the composite index had ten false signals since 1961 and the average forecasting lead for recessions fell from 7 months to a lag of 0.6 month when real M1 was used instead of the yield curve.

Comparison of Components of the Composite Leading Indicator and Economic Cycles

The timing of economic cycles may be defined using the business cycle or the growth cycle concept. The objective of the first concept is to determine the peaks and troughs by examining the depth, duration, and diffusion of the cyclical declines in coincident indicators of economic activty. A study by Cross (1982) reported the dates of the peaks and troughs for the Canadian economy based on this concept. However, economic cyle chronologies may also be dated with the growth cycle concept. Contrary to the first concept, which involves a fall and rise in economic activity, the growth cycle concept involves fluctuations around the long-run trend. Therefore, the expansion (contraction) phase is a period when the short-term growth rate of economic activity is greater (smaller) than the long-run rate. Typically, growth cycle changes will occur more frequently than business cycle fluctuations. As with the preceding concept, dates of the growth cyle chronologies are determined from a number of monthly coincident economic time series.

Our objective was to build a composite leading indicator of turning points going into and out of a recession, which is most often defined as two or more consecutive declines in the quarterly GDP. To convert this definition of a recession into monthly terms, it was assumed that the first month of the first quarter of the recession marks the beginning of the recession and the first month of the first quarter following the recession marks the beginning of the recovery.[5] These economic cycles are delineated by the shaded recession periods. Charts 1.1 to 1.7 compare movements in each of the components of the composite leading indicator with cycles in the economy since 1961.

The charts show that:

- each component of the leading indicator generally leads turning points in total economic activity; and
- the lead on downturns in the economy is generally longer than the lead on upturns.

However, the leading indicators are volatile and the relationship between the indicators and turning points in total output tends to be inconsistent. Most components have some extended periods of decline that are not followed by recessions. Also, the lead on turning points tends to be highly variable.

These problems are largely due to the fact that the individual indicators lead changes in activity in particular sectors of the economy rather than for the overall economy. As the timing of cycles of individual sectors does not always correspond with the timing in the total economy, the signal given by the individual indicators may not always lead overall turning points. Downturns (recoveries) in one sector of the economy may be offset by continued strength (weakness) in other sectors. As a result, a weighted average of the components should provide more reliable forecasts of turning points in the overall economy by eliminating signals that are not widespread in the economy.

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[5] Revisions to the quarterly GDP data reduced the number of consecutive quarters of decline in the 1974-75 period from two to one. However, according to Statistics Canada's recession-dating procedure, which employs a broad spectrum of monthly indicators to determine periods of recession, there still was a recession at that time. We have used Statistics Canada's dates (see Cross 1982) for this recession. The forecasting performance of the new composite leading indicator at cyclical turning points was investigated with the Statistics Canada's reference dates for the recessions. We found no significant differences in terms of the average forecasting lead at peak and trough. The number of cyclical downturns and upturns signalled in advance was also the same.

Chart 1.1
Indicator of Consumer Confidence

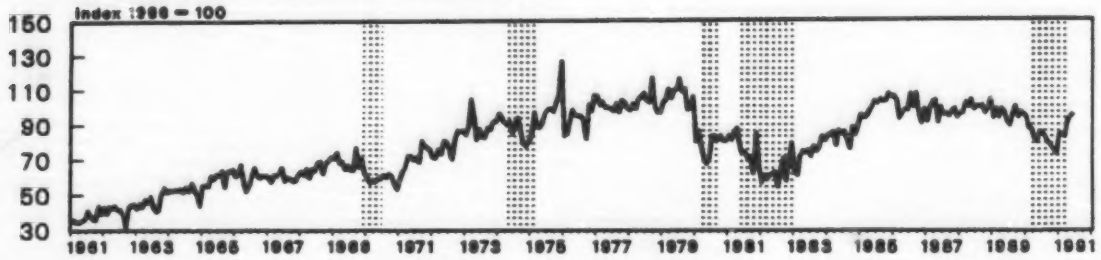


Chart 1.2
Real Residential Building Permits

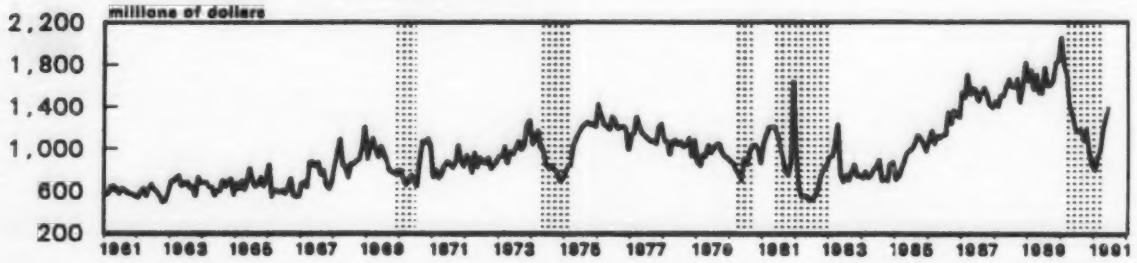


Chart 1.3
Real Non-Residential Building Permits

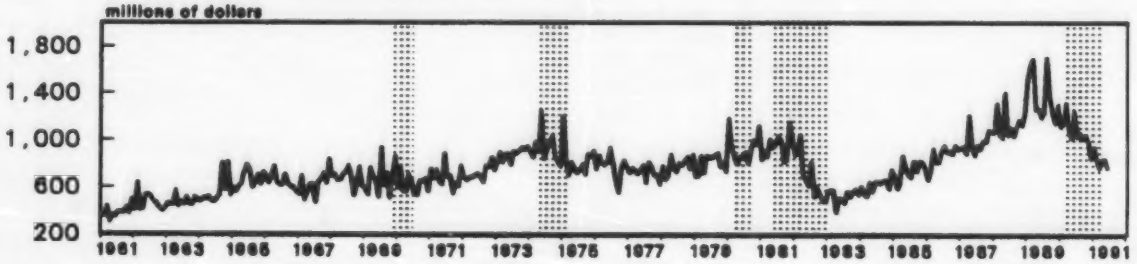


Chart 1.4
Manufacturing Inventory-to-Shipments Ratio

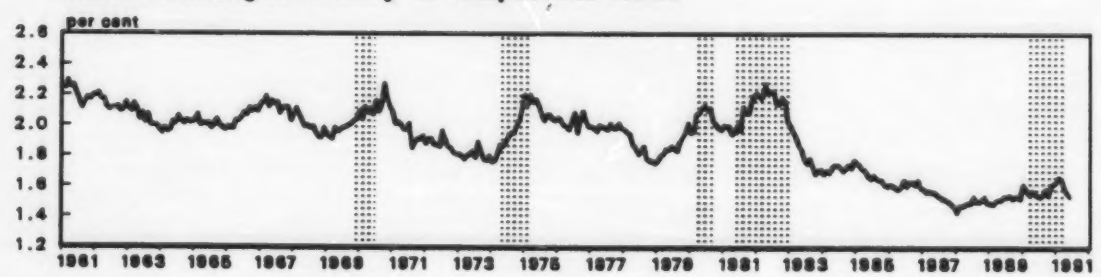


Chart 1.5
U.S Composite Leading Indicator

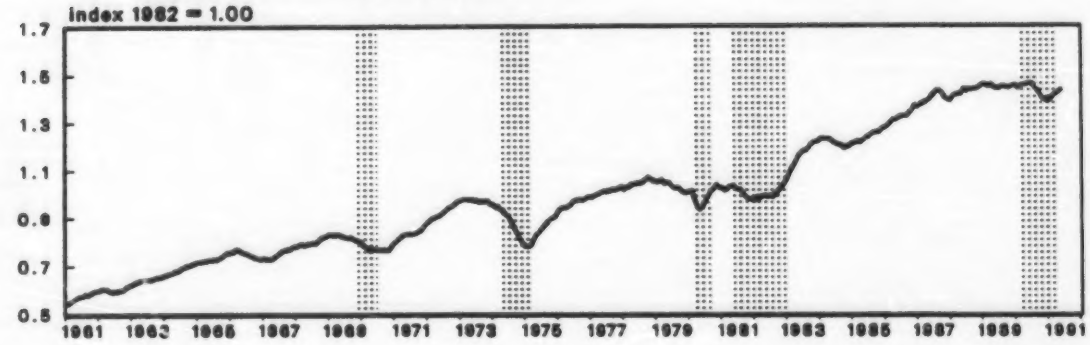


Chart 1.6
Smoothed Yield Curve

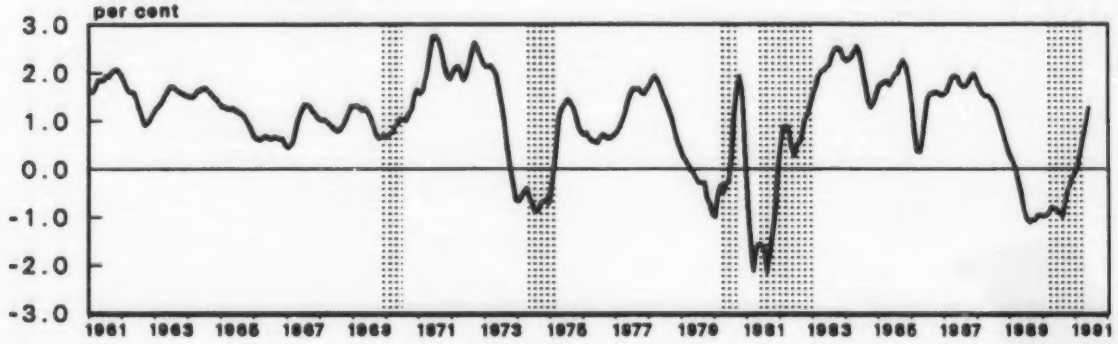
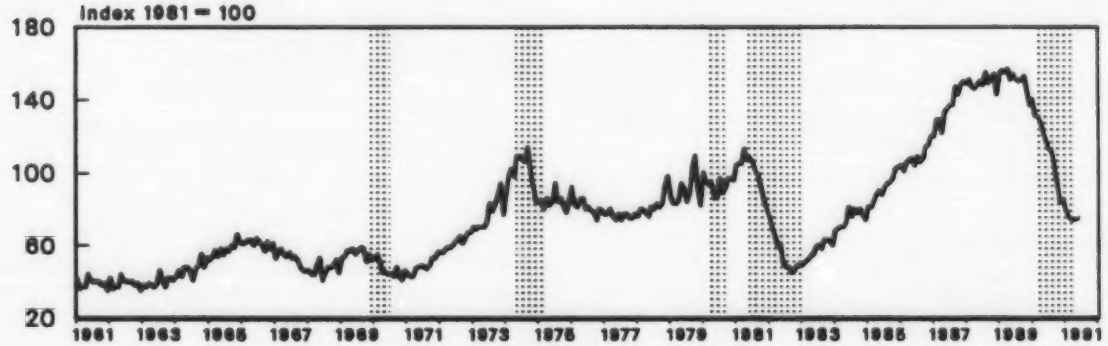


Chart 1.7
Help Wanted Index



II CONSTRUCTION OF THE NEW COMPOSITE LEADING INDICATOR[9]

The construction of the new composite leading indicator requires several operations on both the individual components and the composite indicator.[10] The two main objectives are:

- to construct a composite leading indicator that is not dominated by strong monthly variations in any of its components; and
- to obtain a composite leading indicator with the same trend as real GDP.

The first step is to calculate the month-to-month percentage change for the five components that are in level form[11]. The following formula was used to impose the condition that if a series of increases and declines sums to zero, the percentage changes will also sum to zero[12].

$$c(t) = 200*(C(t) - C(t-1)/(C(t) + C(t-1))$$

As indicated in the Handbook of Cyclical Indicators, the first difference was calculated for those components already in a percentage change or a ratio form.[13]

The next step is the standardization of each component. This statistical operation is necessary to prevent volatile components, such as building permits, from dominating the change in the composite indicator. The components were standardized by dividing the monthly changes, as computed in the preceding step, by their long-run average without regard to sign.

The third step is designed to combine standardized changes of each component into a single composite leading indicator. Other agencies typically assume equal weights on all components. This assumption, however, was not made in the present study. Different weights were estimated for the components of the new composite leading indicator. The weights were based on the historical relationship between standardized changes in each component and real GDP. The following econometric method was used to determine the weights. First, several regressions were performed between the standardized change of real GDP -- the monthly coincident indicator of overall economic activity -- and the standardized change of each individual component during the period t-i, i = -1, -2, ..., -24.[14] Twenty-four different equations were estimated for each component to select the weights.

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[9] The new composite leading indicator was constructed using the method outlined in the Handbook of Cyclical Indicators, U.S. Department of Commerce (1977).

[10] This section is based on a description of the method used by the U.S Department of Commerce to construct their composite leading indicator. The method may be found in Handbook of Cyclical Indicators, U.S. Department of Commerce (1977).

[11] The components are: sales of passengers cars, sales of existing houses, residential and non-residential building permits, U.S composite leading indicator and the Help Wanted Index.

[12] The usual formula for calculating the percentage changes would result in the sum of the percentage changes being greater than zero for a series of increases and decrease that left the absolute number unchanged. This occurs because the denominator for the percentage declines would be on average larger than the denominators for the increases.

[13] The first difference was taken of the ratio of inventory to shipments. However, the first difference was not calculated for the yield curve, since it is equal to a difference of interest rates.

[14] This arbitrary method avoids multicollinearity problems between the different lags of each component and permits to obtain a more reliable estimate of the components weights.

Then, we selected the weight associated with the most significant lag. The Table 1.2 gives the weights for each of component of the new composite leading indicator. The weights are constrained to sum to 1. As indicated in the table, the weights vary significantly between components. The smoothed yield curve and and the U.S. composite leading indicator have the largest weights, 0.33 and 0.22 respectively. The other weights range from 0.04 to 0.11.[15]

Table 1.2

Weight of each component of the new composite leading indicator[1]

Components	Weights
Indicator of consumer confidence	0.11
Real residential building permits	0.09
Real non-residential building permits	0.04
Inventory to shipments ratio	0.11
U.S composite leading indicator	0.22
Smoothed yield curve	0.33
Help Wanted Index	0.10
Total	1.00

1. The component weights are not similar to the GDP weights. Instead, they represent their importance in initiating cyclical change in real GDP.

The fourth step ensures that changes in the composite leading indicator can be compared with those of GDP by making the average absolute variation of the new composite indicator equal to that of real GDP. This operation is performed by dividing the new composite index, calculated in the previous operation, by a standardization factor equal to the ratio between its long-term average and the long-term average of real GDP.

[15]We also tested whether there was a stable relationship between the standardized changes in each components and real GDP. Chow tests indicates that the stability assumption could not be rejected. The Chow stability test was performed for the 1960s compared to the 1970s and 1980s.

The final step is designed to obtain a new composite leading indicator with the same trend as the trend in real GDP. This operation involves adding the difference between the trend of the real GDP and that of the new composite index calculated in the previous step. The new composite leading indicator is then converted into an index with 1986 as the base year.

III USEFULNESS OF THE NEW COMPOSITE LEADING INDICATOR IN FORECASTING CYCLICAL TURNING POINTS IN ECONOMIC ACTIVITY

One way of evaluating the new leading indicator is to examine its historical ability to provide reliable advance signals of turning points. Before assessing this, however, we must establish when changes in the leading indicator reliably signal turning points. One approach is to examine the performance of the leading indicator using various rules for predicting a turning point. Table 1.3 shows the historical performance of the index in terms of false signals and lead time based on the number of months approach.

Table 1.3

Performance of the New Composite Leading Indicator in Forecasting Turning Points

Number of consecutive declines or increases	Peaks		Troughs	
	False signals	Lead time[2]	False signals	Lead time
1[1]	30	-9.0[3]	0	-2.6
2	3	-8.0	0	-1.2
3	1	-7.0	0	+0.6
4	1	-4.2	0	+2.0

1. To signal in advance an upturn in economic activity, the one-month rise in the composite index must be accompagnied by an increase in at least four components.
2. Forecasting lead time (see footnote 16).
3. (-) indicates a lead and (+) indicates a lag.

The most reliable rule to forecast a cyclical downturn with the composite indicator is three months of declines. Using this rule, the index had only one false signal since 1961 and the average forecasting lead time was 7 months[16]. With four months of decline, there was also one false signal but the average the lead time was cut by 40 per cent. For cyclical upturns in the economy, the one-month increase accompanied by a rise in at least four of the seven components accurately signalled the onset of all recoveries over the historical period.[17] Also, the one month increase maximized the forecasting lead time at the trough.

[16] The forecasting lead is equal to the lead minus the number of months lost in identifying the cyclical turning point. Hence, the use of a "three months decrease and one month increase" to signal in advance a recession and recovery involves respectively the loss of 2 months and zero months of the lead.

[17] This supplementary condition makes it possible to ensure that an upturn in the new composite leading indicator is not due to irregular fluctuations in very few components.

Then, we selected the weight associated with the most significant lag. The Table 1.2 gives the weights for each of component of the new composite leading indicator. The weights are constrained to sum to 1. As indicated in the table, the weights vary significantly between components. The smoothed yield curve and and the U.S. composite leading indicator have the largest weights, 0.33 and 0.22 respectively. The other weights range from 0.04 to 0.11.[15]

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[16] The forecasting lead is equal to the lead minus the number of months lost in identifying the cyclical turning point. Hence, the use of a "three months decrease and one month increase" to signal in advance a recession and recovery involves respectively the loss of 2 months and zero months of the lead.

[17] This supplementary condition makes it possible to ensure that an upturn in the new composite leading indicator is not due to irregular fluctuations in very few components.

Table 1.4 and Chart 1.8 summarize the usefulness of the new composite leading indicator in providing advance signals of cyclical downturns and upturns in aggregate economic activity:

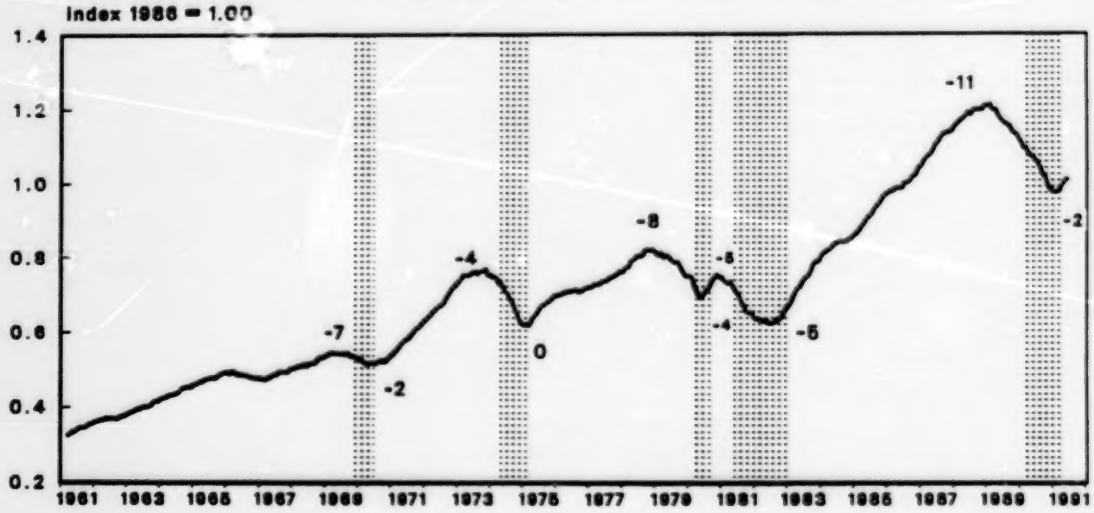
- There was only one false signal of a recession, in 1966, just prior to a significant growth slowdown in 1966-67.
- Since 1961, the new composite leading indicator would have signalled all recessions 4 to 11 months in advance. On average, the forecasting lead has been 7.0 months.
- The composite indicator signalled 4 of the 5 economic recoveries in advance, and provided a coincident signal of the recovery following the 1974-75 recession. The forecasting lead at the business cycle troughs ranged from 0 to 5 months. On average, the forecasting lead at the trough was 2.6 months.

Table 1.4

Usefulness of the New Composite Leading Indicator in Forecasting Turning Points

Number of false signals	1
Forecasting lead at peak (mean in months)	-7.0
Forecasting lead at trough (mean in months)	-2.6
Number of cyclical downturns signalled in advance	5 out of 5
Number of cyclical upturns signalled in advance	4 out of 5
Number of cyclical turning points signalled in advance	9 out of 10

Chart 1.8
A New Composite Leading Indicator for the Canadian Economy*



*The numbers entered in the chart indicate the forecasting lead (-) or lags (+) in months from the business cycle turning points.

Furthermore, Chart 1.8 clearly shows that the composite indicator was able to provide more consistent and reliable advance signals of turning points than any of its individual components in Charts 1.1 to 1.7. These results suggest that the new composite indicator would have been very accurate in predicting cyclical turning points in the Canadian economy since 1961.

The two major innovations of this composite leading indicator relative to other indicator were:

- The weight on each component of the new composite leading indicator has been estimated based on their historical relationship to changes in real GDP; and
- The yield curve was used as the leading indicator of monetary conditions instead of the stock of money (real M1).

Table 1.5 shows the deterioration in the performance of the composite leading indicator when the innovations are removed. The innovations made the leading indicator much more stable as can be seen from the increase in false signals when they are removed.

Table 1.5

New Composite Leading Indicator: Three Alternatives

	New Leading Indicator	With M1[2]	With Equal Weights[3]
Number of false signals	1	10	8
Forecasting lead[1]:			
- at peak	-7.0	+0.6	+1.8
- at trough	-2.6	-3.5	-3.5
Cyclical turning points signalled in advance			
- Downturns	5 out of 5	2 out of 5	0 out of 5
- Upturns	4 out of 5	5 out of 5	5 out of 5

1. Average in months.
2. The yield curve was replaced by the real stock of money (M1) as the leading indicator of monetary conditions.
3. We assume equal weights on all components. The components are listed in Table 1.1.

Table 1.4 and Chart 1.8 summarize the usefulness of the new composite leading indicator in providing advance signals of cyclical downturns and upturns in aggregate economic activity:

- There was only one false signal of a recession, in 1966, just prior to a significant growth slowdown in 1966-67.
- Since 1961, the new composite leading indicator would have signalled all recessions 4 to 11 months in advance. On average, the forecasting lead has been 7.0 months.
- The composite indicator signalled 4 of the 5 economic recoveries in advance, and provided a coincident signal of the recovery following the 1974-75 recession. The forecasting lead at the business cycle troughs ranged from 0 to 5 months. On average, the forecasting lead at the trough was 2.6 months.

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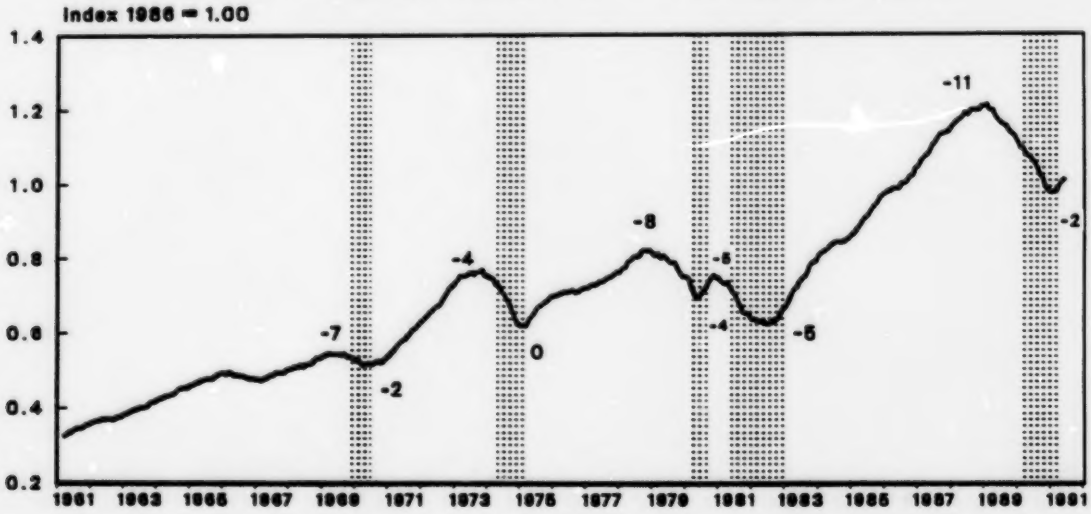

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Timeliness of the new composite leading indicator

The most recent data for the new composite leading indicator will, like any other economic series, be available only with a lag because data have to be compiled and released. As an example, the publication schedule for components of the composite leading indicator for the month of June 1991 is given in Table 1.6.

Table 1.6

Publication Schedule for June 1991 Data

Components	Release date	Time lag
Indicator of consumer confidence:		
- unit sales of passenger cars	Aug 9	5 weeks
- unit sales of existing houses	July 30	4 weeks
Real residential building permit	Aug 29	9 weeks
Real non-residential building permits	Aug 29	9 weeks
Ratio of inventory to shipments	Aug 14	7 weeks
U.S composite leading indicator	July 30	4 weeks
Yield curve	June 30	none
Help Wanted Index	July 3	3 days
Composite leading indicator	**Aug 29**	**9 weeks**

The table indicates that while one component, the yield curve, has no publication delay, other components, such as residential and non-residential building permits, are only available 9 weeks after the end of the reference month. As a result, the composite indicator for June could only be calculated 9 weeks after the end of the month[18], which is about the same delay as occurs with the monthly GDP data. (June GDP data were available August 30.) However, while June GDP data provides an estimate of output growth in that month, the composite indicator for June provides an indication of the start of a recovery in output from zero to 5 months in the future or an indication the start of a recession 4 to 11 months in the future.

[18] However, it is possible to calculate a preliminary version of the new composite leading indicator that is available only four weeks after the end of the reference month. The combined weights of these four components is 76 per cent of the new composite leading indicator. A qualitative analysis indicates that the cyclical movements in the preliminary version are very similar to those of the complete version. Consequently, the scaled-down version is also a reliable leading indicator of cyclical turning points.

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SUMMARY

The new composite leading indicator provides a reliable advance signal of recessions and recoveries. A simplified version of the new composite leading indicator, representing 76 per cent of the total indicator, also gives an advance warning of a cyclical turning points about one month earlier than the complete version. The key characteristics of the performance of the new composite leading indicator of the Canadian economy are:

- the new composite leading indicator would have given only one false signal of a turning point over the past 30 years;
- since 1961, it would have given advance warning of all recessions and all but one recovery; and
- the average forecasting lead at business cycle peaks and troughs are 7.0 and 2.6 months, respectively.

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